

WHAT IS CLAIMED IS:

1. A heating system for heating an enclosed space comprising:

5 a multistage furnace operable to provide heat to said enclosed space at a selected one of plural heating rates, said furnace including a controller for controlling said furnace to operate at a selected one of said plural heating rates;

10 a thermostat operably connected to said controller for providing a signal to call for heat to be generated by said furnace;

a return air sensor operably connected to said controller and operable to sense the temperature of air circulating from said space to said furnace; and

15 said controller is operable to cause said furnace to operate at a selected heating rate depending on one of the temperature and the rate of change of temperature sensed by said return air sensor.

2. The heating system set forth in Claim 1 wherein:

5 said furnace comprises a fossil fuel fired furnace including a fuel control valve operably connected to said controller and operable to control fuel flow to said furnace at multiple flow rates.

3. The heating system set forth in Claim 1 wherein:

said return air sensor is located in a return air duct connected to said furnace upstream of a blower for circulating air through said furnace.

4. A method for controlling operation of a heating system, said heating system including a furnace operable to provide heat to an enclosed space at plural heating rates, a controller for controlling operation of said furnace at
5 selected ones of said plural heating rates, a thermostat for sensing the temperature in an enclosed space being heated by said furnace and for providing a signal or signals to said controller to call for heat at furnace heating rates less than the number of stages of heating rates of which said
10 furnace is capable, and a sensor for sensing air returning from said enclosed space to said furnace for heating thereby, said method comprising the steps of:

energizing said furnace at a first heating rate in response to a signal from said thermostat;

15 sensing the return air temperature with said sensor;

determining at least one of the return air temperature and the rate of return air temperature change versus time; and

20 changing the heating rate of said furnace if said one of return air temperature and rate of change of return air temperature is one of less than and greater than a predetermined amount.

5. The method set forth in Claim 4 including the step of:

changing the heating rate of said furnace only after a predetermined time has elapsed from energizing said
5 furnace at a selected heating rate.

6. The method set forth in Claim 4 including the step of:

increasing the heating rate of said furnace from a first stage to a second stage if the rate of change of temperature of return air is less than said predetermined amount.

7. The method set forth in Claim 4 including the step of:

maintaining the heating rate of said furnace at one of said plural heating rates if the rate of change of temperature of return air is less than a first predetermined amount but greater than a second predetermined amount.

8. The method set forth in Claim 7 including the step of:

maintaining said one heating rate after a predetermined elapsed time from initiation of said one heating rate.

9. The method set forth in Claim 7 including the step of:

increasing the heating rate of said furnace if the rate of change of return air temperature is less than said second predetermined amount.

10. The method set forth in Claim 4 including the step of:

decreasing the heating rate of said furnace if the rate of change of return air temperature is greater than said predetermined amount.

11. The method set forth in Claim 4 including the step of:

increasing the heating rate of said furnace if the rate of change of return air temperature is negative.

12. The method set forth in Claim 4 including the step of:

de-energizing said furnace when the temperature of air in said space reaches a predetermined amount as sensed by said thermostat.

13. The method set forth in Claim 4 wherein:

said furnace is operable to generate heat at a first heating rate, a second and greater heating rate, and a third and still greater heating rate, and said method comprises the steps of:

causing said furnace to generate heat at said first heating rate upon receiving a signal by said controller from said thermostat and changing said heating rate from said first heating rate to said second heating rate only after a first predetermined period of time regardless of the rate of return air temperature change.

14. The method set forth in Claim 13 including the step of:

maintaining the heating rate of said furnace at said first heating rate after said first predetermined period of time if the rate of temperature increase sensed by said return air sensor is greater than a first predetermined amount.

15. The method set forth in Claim 14 including the step of:

energizing said furnace at said second heating rate if the rate of temperature increase sensed by said return air sensor is less than said first predetermined amount.

16. The method set forth in Claim 15 including the steps of:

initiating a second predetermined period of time upon energizing said furnace at said second heating rate, and;

causing said furnace to maintain said second heating rate if the rate of return air temperature increase after said second predetermined period of time is greater than a second predetermined amount but less than said first predetermined amount.

17. The method set forth in Claim 15 including the step of:

causing said furnace to generate heat at a third heating rate if the rate of return air temperature increase at said second heating rate is less than said second predetermined amount.

18. The method set forth in Claim 17 including the steps of:

initiating a third predetermined period of time upon causing said furnace to generate heat at said third heating rate, determining the rate of temperature change of said return air and, after expiration of said third predetermined period of time, returning operation of said furnace to said second heating rate if the rate of temperature increase of said return air is greater than a third predetermined amount.

19. The method set forth in Claim 18 including the step of:

continuing the operation of said furnace at said third heating rate if the rate of temperature increase of said return air is less than said third predetermined amount.

20. The invention set forth in Claim 4 including:

a multistage furnace operable in accordance with said method to provide heat to said enclosed space at a selected one of said plural heating rates.

21. The invention set forth in Claim 20 wherein:

said furnace comprises a fossil fuel fired furnace including a fuel flow control valve.

22. The invention set forth in Claim 21 wherein:

said control valve is operably connected to a controller and is operable to control fuel flow to said furnace at multiple flow rates.

23. The invention set forth in Claim 4 including:
a return air sensor operably connected to a controller for said furnace to sense the temperature of air circulating from said space to said furnace.

24. The invention set forth in Claim 23 wherein:
said return air sensor is disposed in a return air duct connected to said furnace upstream of a blower for circulating air through said furnace.

25. The invention set forth in Claim 4 including:
a thermostat operably connected to a controller for said furnace for providing a call for heat signal or signals to said controller at heating rates of said furnace
5 less than which said furnace is capable of operating.

26. The invention set forth in Claim 25 wherein:
said thermostat is a single stage thermostat.

27. The invention set forth in Claim 4 including:
a controller operably connected to a thermostat for said furnace, said controller being programmable to operate in accordance with said method.